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Report of the individual review of the annual submission of New Zealand submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of New Zealand, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 2 to 7 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anna Romanovskaya (Russian Federation) and Ms. Daniela Romano (Italy); energy – Mr. Ole-Kenneth Nielsen (Denmark), Mr. Aidan Kennedy (Ireland) and Mr. Kaleem Mir (Pakistan); industrial processes and solvent and other product use – Ms. Sina Wartmann (Germany) and Mr. Dusan Vacha (Czech Republic); agriculture – Mr. Etienne Mathias (France) and Mr. James Douglas MacDonald (Canada); land use, land-use change and forestry (LULUCF) – Ms. Inês Mourão (Portugal) and Mr. Raehyun Kim (Republic of Korea); and waste – Ms. Medea Inashvili (Georgia) and Mr. Takefumi Oda (Japan). Ms. Inashvili and Mr. Nielsen were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of New Zealand, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2012 annual review report of New Zealand was published after the submission of the 2013 annual submission.

3. In 2011, the main greenhouse gas (GHG) in New Zealand was carbon dioxide (CO_2), accounting for 45.5 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (37.2 per cent) and nitrous oxide (N_2O) (14.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.7 per cent of the overall GHG emissions in the country. The agriculture sector accounted for 47.2 per cent of total GHG emissions, followed by the energy sector (42.6 per cent), the industrial processes sector (7.5 per cent), the waste sector (2.7 per cent) and the solvent and other product use sector (0.04 per cent). Total GHG emissions amounted to 72,923.48 Gg CO_2 eq and increased by 22.1 per cent between the base year[2] and 2011. The ERT concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Additional background data on recalculations by New Zealand in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

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[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year [a] to 2011

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	25 047.06	25 047.06	27 384.61	31 350.29	36 452.55	33 515.31	33 421.91	33 175.53	32.5
		CH_4	25 746.40	25 746.40	26 483.20	28 015.60	26 497.76	26 918.18	26 943.81	27 119.26	5.3
		N_2O	8 307.71	8 307.71	9 204.23	9 855.36	10 322.54	10 134.53	10 436.11	10 695.74	28.7
		HFCs	NA, NO	NA, NO	122.81	252.99	807.26	872.41	1 077.69	1 885.16	NA
		PFCs	629.87	629.87	131.16	58.06	38.84	46.14	40.81	30.18	–95.2
		SF_6	15.20	15.20	17.88	10.57	15.13	19.79	20.46	17.62	15.9
KP-LULUCF	Article 3.3[b]	CO_2					–16 533.79	–16 834.20	–17 325.13	–16 771.19	
		CH_4					2.65	4.49	4.29	5.19	
		N_2O					0.27	0.46	0.44	0.53	
	Article 3.4[c]	CO_2	NA				NA	NA	NA	NA	NA
		CH_4	NA				NA	NA	NA	NA	NA
		N_2O	NA				NA	NA	NA	NA	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

			Gg CO_2eq							*Change (%)*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A		Energy	23 569.19	23 569.19	25 618.40	29 760.88	34 388.99	31 619.14	31 365.22	31 053.66	31.8
		Industrial processes	3 392.84	3 392.84	3 305.23	3 523.76	4 294.05	4 290.59	4 784.47	5 444.65	60.5
		Solvent and other product use	41.54	41.54	44.95	47.12	31.00	27.90	31.00	27.90	–32.8
		Agriculture	30 683.62	30 683.62	32 317.15	34 097.46	33 359.63	33 526.06	33 747.31	34 411.88	12.2
		Waste	2 059.06	2 059.06	2 058.15	2 113.65	2 060.40	2 042.67	2 012.80	1 985.40	–3.6
		LULUCF	NA	–28 112.69	–24 347.55	–23 895.20	–23 564.07	–21 815.88	–17 814.36	–13 540.19	NA
		Total (with LULUCF)	**NA**	**31 633.56**	**38 996.33**	**45 647.68**	**50 570.01**	**49 690.48**	**54 126.43**	**59 383.29**	**NA**
		Total (without LULUCF)	**59 746.25**	**59 746.25**	**63 343.88**	**69 542.88**	**74 134.08**	**71 506.36**	**71 940.80**	**72 923.48**	**22.1**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation					–18 117.06	–18 197.32	–18 349.83	–18 440.09	
		Deforestation					1 586.19	1 368.06	1 029.40	1 674.62	
		Total (3.3)					**–16 530.87**	**–16 829.26**	**–17 320.43**	**–16 765.48**	
	Article 3.4[d]	Forest management					NA	NA	NA	NA	
		Cropland management	NA				NA	NA	NA	NA	NA
		Grazing land management	NA				NA	NA	NA	NA	NA
		Revegetation	NA				NA	NA	NA	NA	NA
		Total (3.4)	**NA**				**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 12 April 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and a NIR. New Zealand also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 12 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. New Zealand officially submitted revised emission estimates on 7 September 2013 in response to questions raised by the ERT during the review (see paras. 33, 36, 38, 45, 48 and 58 below).

8. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

9. Table 3 contains the ERT's overall assessment of the annual submission of New Zealand. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: NA Non-mandatory: The Party has reported the notation key "NE" for: CH_4 emissions from steel production; CO_2 emissions from solvent and other product use; CH_4 emissions from enteric fermentation – poultry; N_2O emissions from industrial wastewater; and N_2O emissions from domestic and commercial wastewater (without human sewage)
Land use, land-use change and forestry[a]	Complete	Mandatory: NA Non-mandatory: The Party has reported the notation key "NE" for: CO_2 emissions from DOM for cropland remaining cropland and for

		General findings and recommendations
		several sub-divisions in grassland remaining grassland (see para. 64 below); CO_2 emissions from settlements remaining settlements and from DOM in several sub-divisions in cropland and grassland converted to settlements and in high-producing grassland converted to other land; non-CO_2 (CH_4 and N_2O) emissions from drainage of soils and wetlands; and CO_2, CH_4 and N_2O emissions from biomass burning on settlements and other land
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	Recalculations performed in all sectors of the GHG inventory (see table 9) The rationale for recalculations is provided in both the NIR and in CRF table 8(b). However, this information could be improved in the energy sector (see para. 23 below)
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	New Zealand has made improvements in the implementation of QA/QC procedures and the development of automated systems to prevent errors and inconsistencies in data submission
The ERT's findings on the transparency of the 2013 annual submission	Generally sufficient	The ERT identified areas for improvement, including in the reporting of confidential data in the industrial processes sector (see para. 40 below) and in the description of methods in the agriculture and LULUCF sectors (see paras. 55, 57, 59, 60, 61, 62, 66 and 67 below)

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, DOM = dead organic matter, ERT = expert review team, GHG = greenhouse gas, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

10. The NIR and additional information provided by the Party during the review described the national system for the preparation of the inventory. The Ministry for the Environment (MfE) has overall responsibility for the national inventory. Other agencies and organizations are also involved in the preparation of the inventory. The Ministry of Business, Innovation and Employment is responsible for emissions from the energy sector

and CO_2 emissions from the industrial processes sector; the Ministry for Primary Industries compiles emissions from the agriculture sector.

11. The Reporting Governance Group provides leadership over the reporting, modelling and projections of GHG emissions and removals. Membership includes representation from MfE, the Environmental Protection Authority, the Ministry for Primary Industries and the Ministry of Business, Innovation and Employment. The key roles of this group include guiding, conferring and approving inventory and projection improvements and assumptions (on the basis of advice from technical experts), planning and priorities, key messages, and the management of stakeholders and risks.

12. The main source of inventory data is Statistics New Zealand, which provides many of the official statistics for the agriculture sector, including on lime application and livestock slaughtering, and other data for the waste sector and the solvent and other product use sector. The Ministry for Primary Industries provides data from the National Exotic Forest Description and from the New Zealand emissions trading scheme (NZ ETS) on planting, harvesting and deforestation to the MfE Land Use and Carbon Analysis System and assists in the preparation of estimates for the LULUCF sector and activities under Article 3, paragraph 3, of the Kyoto Protocol.

13. New Zealand has developed a quality assurance/quality control (QA/QC) plan and very detailed guidelines for compiling its GHG inventory, including steps to follow to implement QA/QC checks and verification activities for each individual sector. This documentation was supplied to the ERT during the review in response to questions raised.

14. The ERT noted that the QA/QC procedures have been applied across the GHG inventory, and found that this has improved the quality of the annual submission. Notwithstanding this effort, New Zealand continues to strive to improve the quality of its inventory, as noted by the ERT in the response of the Party to a question raised by the ERT during the review. New Zealand indicated that the QC system needs to be further strengthened through use of automated methods of control and the use of a specific model to manage significant quantities of data. The ERT commends New Zealand on its effort to continually strive to improve the quality of its inventory through an enhanced QA/QC system. The ERT recommends that New Zealand provide information on the progress made in strengthening its QA/QC system in the NIR.

Inventory preparation

15. Table 4 contains the ERT's assessment of New Zealand's inventory preparation process.

Table 4
Assessment of inventory preparation by New Zealand

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for	Yes	Level and trend key category analysis performed, including and excluding LULUCF

		General findings and recommendations
LULUCF)?		
Approach followed?	Tier 1	New Zealand explained in its NIR that it did not elect to address the recommendation contained in the 2012 annual review report in relation to implementing a tier 2 key category analysis due to other priorities
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	New Zealand did not include in CRF table NIR-3 the required key category analysis information
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	No	The ERT identified minor changes in the analysis that arise directly from changes in the relative contribution of subcategories to total GHG emissions when compared with the corresponding 2012 analysis (e.g. CH_4 emissions from enteric fermentation (non-dairy cattle and deer have been identified as key categories in this annual submission))
Assessment of uncertainty analysis		
Approach followed?	Tier 1	Applied to all categories with the exception of N_2O from agricultural soils (a tier 2 analysis was applied)
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = ±15.3% Trend = ±8.6%	
Quantitative uncertainty (excluding LULUCF)	Level = ±12% Trend = ±2.3%	

Abbreviations: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

16. New Zealand does not have a centralized archiving system and instead has implemented a hybrid approach for inventory programme management. Publication and submission of the inventory is the responsibility of MfE, which also centralizes management of all the related material, data files, CRF tables, backup database files from the CRF Reporter, sectoral chapters of the NIR, the compiled NIR, sign-off confirmations, communication between the inventory team and the ERTs, and guidelines for inventory submission. This material is stored in the MfE secure file management system. Sectoral data (including communication with contractors, activity data (AD), emission factors (EFs), preliminary calculations, and specific software applications containing sectoral data models) are kept in secure file systems at each agency responsible for the relevant emission estimates. Each of the agencies has security procedures in place in case of natural disasters, fire, flood or other accidents, which are kept to a high standard.

17. New Zealand did not address the recommendation made in the previous review report relating to providing enhanced information in its NIR on the archiving system. In response to a question raised by the ERT during the review, this information was provided by the Party. The ERT reiterates the above-mentioned recommendation, which is that New Zealand include in its NIR information provided to the present ERT during the review week on the archiving system and how it is organized, and specify what is archived at MfE and at other agencies.

18. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

4. Follow-up to previous reviews

19. The ERT concluded that New Zealand continues to strive to improve the quality of its GHG inventory. Most recommendations made in the previous review report have been addressed by the Party, which the ERT found improved the transparency of information contained in the NIR in relation to the emissions estimation process, and in the choice of uncertainty parameters in the LULUCF sector. However, recommendations made in the previous review report in relation to the following were not addressed by the Party in the 2013 annual submission: improved documentation on its archiving system (see para. 17 above); the rationale for recalculations (see para. 23 below); reporting of fugitive emissions (oil and natural gas) (see para. 34 below); the treatment of confidential data in the industrial processes sector (see para. 40 below); the description of specific methodologies used in the agriculture sector (see para. 57 below), the waste sector (see para. 72 below) and KP-LULUCF (deforestation) (see para. 76 below); the inclusion under KP-LULUCF of non-CO_2 emissions from controlled burning and wildfires on land subject to deforestation (see para. 77 below); and the inclusion of the years of issuance of emission reduction units (ERUs) in its publicly available information (see para. 78 below).

5. Areas for further improvement identified by the expert review team

20. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8 below.

B. Energy

1. Sector overview

21. In 2011, emissions from the energy sector amounted to 31,053.66 CO_2 eq, or 42.6 per cent of total GHG emissions. Since 1990, emissions have increased by 31.8 per cent. The key drivers for the rise in emissions were increases in emissions from transport (62.5 per cent), energy industries (8.4 per cent) and fugitive emissions from oil and natural gas (83.6 per cent). Within the sector, 45.1 per cent of the emissions were from transport, followed by 20.8 per cent from energy industries, 16.4 per cent from manufacturing industries and construction and 9.9 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 6.4 per cent and those from solid fuels accounted for the remaining 1.3 per cent.

22. The previous ERT noted in the 2012 annual review report that New Zealand undertook a review of its energy data in 2011. The 2013 review conducted by New Zealand identified inconsistencies in sector reporting and missing data (e.g. natural gas consumption in manufacturing industries and construction) that were subsequently resolved by the Party prior to submission. However, the exact nature of these inconsistencies and missing data and how they were resolved was not described in the NIR. The ERT recommends that New Zealand include this information in its NIR.

23. The ERT concurs with a finding contained in the previous review report regarding the transparency of reporting recalculations in the energy sector. The ERT reiterates a recommendation made in the previous review report that New Zealand include more background information on each recalculation with a view to enhancing the transparency of the GHG inventory.

24. The ERT noted that New Zealand did not report fuel consumption and corresponding emissions from military activities under other (energy). In response to a question raised by the ERT during the review, the Party explained that it does not collect information and data that would enable these emissions to be reported separately, and that this is a low-priority improvement. However, the Party indicated that it would consider this improvement in future annual submissions. The ERT recommends that New Zealand include in its NIR information on progress made towards reporting emissions from military activity under other (energy).

2. Reference and sectoral approaches

25. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 26–31 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach	Energy consumption: 3.48 PJ, 0.80% CO_2 emissions: 187.35 Gg CO_2, 0.66%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	26 and 27
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	29
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	31

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

26. The ERT identified that the fluctuation in the difference between the reference and sectoral approaches is considerable over the time series, ranging from –8.4 per cent in 1992 to +2.5 per cent in 2010. The NIR attributes the difference to the inclusion of amounts of gas flared at offshore platforms in the reference approach which are not included in the sectoral approach. However, the ERT found that the amount of flared gases has been excluded from the reference approach in the 2013 annual submission. Further, according to the NIR (page 46), much of the remaining difference is due to statistical differences found in the energy balance tables that are used as the basis for the reference and sectoral approaches. The ERT recommends that New Zealand apply greater rigour in its investigation of underlying reasons for the differences over the time series, especially for the later years when it is greater than 2.0 per cent and report thereon in its NIR.

27. The ERT noted that New Zealand combines in the reference approach the reporting of liquefied petroleum gas, a secondary fuel, with natural gas liquids, a primary fuel. The ERT recommends that New Zealand separate these fuels, with a view to improving the transparency of the comparison assessment, and report thereon in the NIR. Further, the ERT recommends that New Zealand also separately report naptha (currently combined with crude oil) and lubricants and petroleum coke (currently combined under bitumen).

International bunker fuels

28. In its 2013 annual submission, New Zealand has included a cross-reference between sections 3.2.2 and 3.3.3 of the NIR in relation to fuel allocation between civil and international aviation bunkers. The ERT commends New Zealand on this improvement, which enhances the transparency of the inventory.

29. The allocation of fuel between civil aviation and international aviation is based on the Delivery of Petroleum Fuels by Industry survey, which allocates the fuel sold to international or domestic aviation depending on the goods and services tax (GST) charged (GST is not charged on fuel sold for international flights). The present ERT concurs with the finding in the previous review report that there is an inconsistency in the jet kerosene figures for international bunkers between CRF table 1.A(b) (33.46 PJ) and CRF table 1.C (34.12 PJ). In response to a question raised by the ERT during the review, New Zealand explained that this inconsistency arises from the use of supply-side data in the reference approach and demand-side data in the sectoral approach (to provide consistency with each of their data sets). The ERT recommends that New Zealand address this inconsistency and report thereon in its NIR.

30. The ERT noted that New Zealand has addressed a recommendation made in the previous review report in regard to the CH_4 EF for international aviation. The ERT concludes that New Zealand has rectified the potential overestimate and corrected the associated reference to the source of the EF given in table A2.3 of the NIR. The ERT commends New Zealand for this improvement.

Feedstocks and non-energy use of fuels

31. The ERT noted that New Zealand has reported emissions from methanol production from natural gas under manufacturing industries and construction (chemicals). These emissions ordinarily are reported in the industrial processes sector, and the NIR (page 48) provides an explanation for this reporting that relates to confidentiality. However, the ERT found this explanation to be ambiguous. When referring to carbon oxidized during methanol and synthetic petrol production, the explanation states that "the balance of the carbon is oxidised and results in CO_2 emissions reported in the associated sector". However, in the case of methanol production, the emissions have not been reported in the "associated sector" (industrial processes). The ERT recommends that New Zealand address this perceived ambiguity and report thereon.

3. Key categories

Stationary combustion: solid fuel – CO_2

32. New Zealand recalculated emissions across the entire time series using a CO_2 EF based on 2007 domestic coal production data. The ERT found that using an EF derived from 2007 production data is appropriate for calculating emissions for recent years of the inventory time series; it may not, however, be appropriate for earlier years of the time series. The ERT considers that EFs taken from the *New Zealand Energy Information Handbook* may be better suited to these earlier years. The ERT recommends that New Zealand investigate the appropriateness of the 2007 EF for use in the earlier years of the inventory time series, and report thereon.

Coal mining and handling – CH_4

33. The ERT identified that New Zealand was using the midpoint of the EF range for surface mining (1.15 m^3/tonne) from the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) rather than the recommended value (1.5 m^3/tonne) from the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) (1.5 m^3/tonne). In response to a question raised by the ERT during the review, New Zealand acknowledged the error and subsequently submitted revised emission estimates to the ERT on 7 September 2013 using the EF contained in the IPCC good practice guidance. These revised estimates increased emissions for each year between 2008

and 2011 by between 17.10 and 20.01 Gg CO_2 eq. The ERT agrees with the revised emission estimates and recommends that New Zealand include information on the correction and recalculations in its NIR.

Oil and natural gas – CO_2 and CH_4

34. The ERT noted from the NIR that individual gas field operators provide information on the amount of gas extracted, vented, flared and used on site at each gas field. However, the ERT also noted that New Zealand has continued to report fugitive emissions from oil exploration and production, natural gas exploration and production/processing and from venting in CRF table 1.B.2 under flaring (combined). The ERT reiterates a recommendation made in the previous review report that the Party report estimates of emissions from venting and flaring separately. Further, with a view to increasing transparency, the ERT also recommends that New Zealand report estimates of emissions from oil exploration and production separately from emissions from natural gas exploration and production/processing.

35. The description in the NIR of the methodologies for calculating emissions from natural gas distribution, transmission and storage was not found sufficient by the ERT. In response to questions raised by the ERT during the review in regard to methodologies used to calculate emissions from natural gas distribution, transmission and storage, New Zealand provided background information and details on these. The ERT found the information provided to be consistent with IPCC good practice guidance. The ERT recommends that New Zealand expand the information in its NIR to improve the transparency and understanding of emissions from this subcategory.

36. The ERT noted that AD used to calculate emissions from other leakage of natural gas do not match corresponding natural gas consumption data reported for the energy sector. Further, it was not clear to the ERT how the default IPCC EFs had been converted. In response to a question raised by the ERT during the review, New Zealand explained that the AD used for calculating emissions from leakage at industrial plants are incorrect due to the omission of natural gas used in agriculture and also natural gas used as feedstock in the industrial processes sector. New Zealand also explained that an incorrect conversion from net calorific value to gross calorific value of the default EFs had occurred. Subsequent to this finding New Zealand submitted revised emission estimates to the ERT on 7 September 2013 to correct these errors. The revised estimates increased emissions for each year between 2008 and 2011 by between 19.23 and 30.77 Gg CO_2 eq. The ERT agrees with the revised emission estimates and recommends that New Zealand include information on the corrections and recalculations in its NIR.

4. Non-key categories

Navigation: liquid fuels – CO_2, CH_4 and N_2O

37. The NIR describes the collection of data on marine diesel use in domestic navigation. However, diesel use in domestic navigation is reported as "NO" (not occurring) in the relevant CRF tables. In response to a question raised by the ERT during the review, New Zealand clarified that there has been no use of marine diesel in domestic navigation since 2006. In addition, it agreed that the text of the NIR may be confusing and indicated that it will ensure that the text is clearer in future submissions. The ERT recommends that New Zealand clarify the text in the NIR.

Oil and natural gas – N_2O

38. The ERT identified that New Zealand reported N_2O emissions from flaring as "NO". In response to a question raised by the ERT during the review, New Zealand acknowledged

that N_2O could be formed during flaring activities and subsequently submitted revised emission estimates to the ERT on 7 September 2013. These revised estimates increased emissions for each year between 2008 and 2011 by between 0.002 and 0.003 Gg CO_2 eq. The ERT agrees with the revised emission estimates and recommends that New Zealand include information on the correction and recalculations, and provide an improved description of the methodology, in its NIR.

C. Industrial processes and solvent and other product use

1. Sector overview

39. In 2011, emissions from the industrial processes sector amounted to 5,444.65 Gg CO_2 eq, or 7.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 27.90 Gg CO_2 eq, or 0.04 per cent of total GHG emissions. Since 1990, emissions have increased by 60.5 per cent in the industrial processes sector and decreased by 32.8 per cent in the solvent and other product use sector. The key drivers for the rise in emissions in the industrial processes sector are the increases in emissions from refrigeration and air-conditioning equipment and from iron and steel production, which more than offset the decrease in emissions from aluminium production. Within the industrial processes sector, 42.1 per cent of the emissions were from metal production, followed by 34.9 per cent from the consumption of halocarbons and SF_6, 13.1 per cent from mineral products and 9.9 per cent from chemical industry.

40. The ERT identified six categories in the industrial processes sector for which the AD are reported as "C" (confidential) owing to the limited number of producers/consumers: cement production, limestone and dolomite use, soda ash use, glass production, methanol and steel (steel slab production). For cement production, limestone and dolomite use, soda ash use and steel, New Zealand has reported CO_2 emission estimates for each category. For glass production, CO_2 emissions have been reported as "IE" (included elsewhere) and they have been reported under soda ash use. There is only one methanol producer in the country, hence CH_4 emissions from methanol production have been reported as "IE" and the Party has reported them under the energy sector, specifically under manufacturing industries and construction. In response to questions raised by the ERT during the review, the above-mentioned confidential data were made available to the ERT. Due to the late availability, the ERT did not have sufficient time to assess all the information provided. The ERT reiterates the recommendation made in the previous review report that New Zealand continue its efforts to improve the transparency of its reporting by providing more detailed information in the NIR, while maintaining the confidentiality of the sensitive data.

41. For soda ash use the ERT noted that the NIR states that the default CO_2 EF is used (i.e. full stoichiometric conversion) (415 kg/tonne). The ERT noted that, because emissions are reported, the AD can be calculated simply by dividing emissions by the default CO_2 EF. In response to a question raised by the ERT during the review on this matter, New Zealand acknowledged this and indicated that transparency would be improved in the next annual submission. The ERT recommends that New Zealand report AD for the use of soda ash. Furthermore, the ERT recommends that New Zealand also assess whether it is necessary to report the AD for limestone use as confidential, noting its multiple uses and the ability to calculate the AD from the known CO_2 EF.

42. The use of plant-specific emission estimates reported under the NZ ETS is prevalent in the industrial processes sector. However, the NIR does not contain information on the methodologies used by the plants to estimate these emissions. Without knowing the background methodology for estimating plant-specific emissions, the ERT was not able to apply rigour in its review of the estimates and whether they are prepared in accordance with IPCC good practice guidance. For example, under the NZ ETS a plant reports the calcium

oxide content of clinker, but without information as to how the value has been derived it is not possible to assess the quality of the emission estimate. The ERT recommends that New Zealand include in its NIR detailed information and methodological descriptions on how plant-specific data are estimated. Such information can include frequency of measurements, source streams considered and uncertainty tolerance for measurements of different parameters.

2. Key categories

Consumption of halocarbons and SF_6 – HFCs and PFCs

43. The ERT noted in some cases that documentation in the NIR is insufficient in providing an understanding of the methodology, approach and assumptions used in relation to mobile air conditioning. In response to a question raised by the ERT during the review, New Zealand provided the required information and explained how its methodology is in line with the IPCC good practice guidance. The ERT recommends that New Zealand consider the guidance on reporting of background information provided in the IPCC good practice guidance for all subcategories and report accordingly in the NIR.

44. During the review, the ERT noted that AD and emissions for PFCs in refrigeration and air[-]conditioning equipment are reported as "NO", "NA" (not applicable) and "NE" (not estimated). In response to a question raised by the ERT during the review, New Zealand explained that the imported amount of PFCs is considered as emissions in the year the equipment is imported. This means that the emissions reported are in fact potential emissions and while the emissions over time will be correct, this can imply that emissions are overestimated in some years (with import) and underestimated in other years (without import). The ERT recommends that New Zealand try to obtain the information necessary to calculate actual emissions.

45. During the review, the ERT noted that emissions from stocks are not reported for heptafluoropropane (HFC-227ea) in foam blowing even though AD are reported. In response to a question raised by the ERT during the review, New Zealand explained that this was an error in the reporting and subsequently submitted revised emission estimates to the ERT on 7 September 2013. The revised estimate increased 2011 emissions by 0.09 Gg CO_2 eq. The ERT agreed with this figure and recommends that New Zealand improve its QC activities to identify similar problems in its inventory submission.

3. Non-key categories

Lime production – CO_2

46. The NIR states that all lime production is considered to be high calcium lime and that no dolomitic lime production occurs. In response to a question raised by the ERT during the review, New Zealand provided links to company websites that described the process used at the three lime production facilities in New Zealand. Further, New Zealand also informed the ERT that improvements are planned for this category. The work to be undertaken will include a breakdown of the types of lime produced by the three companies (i.e. hydrated versus non-hydrated). The ERT welcomes this intention and recommends that New Zealand report on the results of the work and revise the entire time series for lime production, if appropriate.

47. The ERT noted that New Zealand has reported the uncertainty of lime production as 100 per cent. This could indicate that significant production of lime was unaccounted for in the estimate. The ERT therefore questioned whether non-marketed lime production occurred in New Zealand, as anticipated in the default uncertainty value provided by the IPCC good practice guidance. New Zealand informed the ERT that production of non-

marketed lime is unknown to authorities even though lime production is included under the NZ ETS. The ERT recommends that New Zealand further investigate the possible production of non-marketed lime and reassess the uncertainty value assigned to lime production in accordance with the result of this investigation.

Limestone and dolomite use – CO_2

48. New Zealand reported in the NIR that one iron and steel plant had reported dolomite use and that this was not included in the inventory. In response to a question raised by the ERT during the review, New Zealand provided a comparison of the emission estimates prepared by the plant under the NZ ETS with the corresponding time series contained in the 2013 annual submission. This comparison showed a difference of 44–50 per cent for 2010 and 2011. In response to further questions raised by the ERT during the review, New Zealand acknowledged that there was an error in the inventory estimate and subsequently submitted revised emission estimates to the ERT on 7 September 2013. The revised estimate increased emissions for 2010 and 2011 by 20.26 and 13.57 Gg CO_2 eq, respectively. The ERT agrees with the revised emission estimates and recommends that New Zealand include information on the correction and recalculations. The ERT also recommends that New Zealand continue to work with industries reporting under the NZ ETS with a view to identifying and resolving methodological differences between the inventory and the NZ ETS.

49. During the review, the ERT enquired about other possible uses of carbonates (e.g. for flue gas desulphurization, ceramics production, water treatment, mineral wool production, fertilizer production, superphosphate production). New Zealand provided the ERT with further information on ceramics production and flue gas desulphurization documenting that carbonates were not used for these purposes in New Zealand. The ERT recommends that New Zealand investigate the possibilities of other uses of carbonate in its inventory. To facilitate this, the ERT recommends that New Zealand consider developing balances of limestone and dolomite (import plus production minus export) to verify that no major uses are not accounted for.

D. Agriculture

1. Sector overview

50. The agriculture sector is the main sector in the GHG inventory of New Zealand. In 2011, emissions from the agriculture sector amounted to 34,411.88 Gg CO_2 eq, or 47.2 per cent of total GHG emissions. Since 1990, emissions have increased by 12.2 per cent. The key driver for the increase in emissions is an increase of 24.7 per cent in total cattle populations and an increase of 500 per cent in nitrogen (N) fertilizer use. A decrease of 46.2 per cent in sheep populations slightly offset these increases. Within the sector, 68.4 per cent of the emissions were from enteric fermentation, followed by 29.5 per cent from agricultural soils, 2.0 per cent from manure management, 0.1 per cent from field burning of agricultural residues and 0.02 per cent from prescribed burning of savannas.

51. New Zealand has made a number of improvements in its 2013 annual submission, specifically the addition of animal categories (mules and asses as well as ostriches and emus), adjustment of country-specific EFs for manure management of poultry and a number of corrections and improvements to its emission model, specifically in the N excretion rates, animal population dynamics and crops model. Planned improvements are summarized in section 6.16 of the "Sector overview" of the NIR and described in detail in category-specific sections. The Party is commended for the excellent quality of its national system for agriculture.

52. Tier 1 uncertainty analyses were carried out in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The ERT did note, however, that tier 2 Monte Carlo simulation uncertainty analyses had been carried out for agricultural soils but the NIR did not include discussions of trend uncertainty. Due to the importance of the agriculture sector in the total emission estimates of New Zealand, some discussion of the uncertainty in the trends in agricultural emissions could be expected. The ERT encourages the Party to provide a specific reference to trend uncertainty in agricultural emissions in its NIR.

2. Key categories

Enteric fermentation – CH_4

53. New Zealand used a tier 2 country-specific methodology to calculate EFs for enteric fermentation from dairy cattle, non-dairy cattle, sheep and deer, which is in line with the IPCC good practice guidance. The approach uses a monthly time step, with detailed feed, growth, cattle weight and milk production data that vary throughout the year. Emissions from other livestock were estimated using tier 1 methods and default EFs (horses, alpaca and swine) or a country-specific EF (goats).

54. During the review, it was noted that it was not possible to verify the implied emission factor (IEF) for sheep in CRF table 4.A because there is a different CH_4 yield rate (Ym) used for young sheep (<1yr) and mature sheep (>1yr) and there is not a weighted Ym presented in the CRF tables. The presentation of weighted Ym factors in the CRF tables provides the ERT with the ability to cross-check the IEF of the Party. The Party is encouraged to provide weighted Ym factors when reporting combined animal subcategories to aid in the verification by the ERT of the Party's emission estimates.

55. The EF used for swine in New Zealand (1.06 kg/head/year) is lower than the IPCC default (1.5 kg/head/year) and among the lowest of all reporting Parties (0.80–1.85 kg/head/year). The explanation for this lower EF is a statement on page 158 of the NIR that swine feed in New Zealand has a lower gross energy than elsewhere. In response to questions raised by the ERT during the review, the Party provided additional documentation that detailed the basis for using lower EFs to estimate emissions from swine. The documentation demonstrates that the EF used for the New Zealand swine industry is based on solid research. The confusion in the NIR is due to an unclear explanation of that research. The ERT recommends that the Party provide in its NIR a clear explanation of the reasons why it is using an EF for emissions from swine that is lower than the IPCC default value.

56. As noted in previous reviews, New Zealand has one of the lowest dairy EFs (80 kg/head/year), among Parties included in Annex I to the Convention (Annex I Parties) (66–137 kg/head/year), and among the lowest milk production (14.6 kg/day within a range of 6 to 31 kg/day among Annex 1 Parties). New Zealand's EFs are higher than the default value from the Revised 1996 IPCC Guidelines for Australia and New Zealand of 68 (kg CH_4/head/year) and milk production of 6.1 kg milk/head/day. The studies cited in the category-specific QA/QC section of the NIR 6.2.4) suggest that lactating dairy cattle are emitting CH_4 at daily rates that are very typical of experimental results observed in other Annex I Parties around the world. The ERT recognizes that it is difficult to compare experimental results with EFs and the Party clearly explained the differences between experimental results provided in the NIR and the assumptions that are inherent in calculating its EFs. The ERT is satisfied with the Party's explanations. The ERT commends New Zealand for reporting experimental validation results in its NIR and encourages the Party to report in its NIR more results of validation studies measuring New Zealand cattle emissions as they become available.

57. In general, details on the methodology in New Zealand's NIR are kept to a minimum; however, the Party has provided in its NIR direct access (with a live link) to its detailed methodology, which is an excellent resource for reviewers, and supplemental information was provided to the ERT rapidly and in great volume upon request. The ERT recognizes that New Zealand uses a complex and country-specific model to produce its estimates and that all the information that goes into those calculations cannot be provided. In response to previous reviews which have recommended that New Zealand include more information on dry matter digestibility, the Party has made efforts to improve the documentation in this regard. Nonetheless, the ERT has identified specific information that would be useful in future reviews of the methodology, based on the responses provided by the Party in response to requests for information and further inquiries for the purposes of transparency and comparability. Firstly, more detailed information is required about animal feed and how feed quality characteristics of pastures have been derived. Chemical analyses data on pasture and feed (dietary neutral detergent fibre, fat, protein, etc.) and specific references to equations used in converting chemical analyses to energy are required to demonstrate the high quality of this feed. Secondly, information about how milk production is measured, how milk production values are validated and about how the monthly milk production is calculated is required. The high feed quality of New Zealand pastures in combination with the level of milk production are important elements in understanding the differences between emissions from New Zealand cattle and other cattle in the world. During the review, New Zealand explained that it had commissioned a study to compile data and information on pasture quality (namely metabolizable energy and nitrogen content) to improve the accuracy of the model inputs, allow N content to vary each month and, for information on dairy farming to allow for some regional disaggregation of pasture quality. Although the study was not complete at the time of the review, New Zealand explained that this project has identified some gaps, particularly in hill country where beef and sheep are grazed. New Zealand also explained that it had commissioned a second study that would involve a nationwide survey of dairy, sheep/beef and deer pastures be biometrically designed and conducted to provide scientifically valid and representative pasture quality data for dairy, sheep/beef and deer farms on a regional basis. The ERT commends New Zealand on the current detailed research initiative. To improve the transparency and comparability of New Zealand's current documentation, the ERT recommends that New Zealand report a summary of some of the findings from the current project on pasture quality either in future versions of its detailed methodology or in future NIRs and also that New Zealand progress its new research and report back on progress in future NIRs. The ERT also recommends that the Party provide a brief summary of how monthly milk production is calculated, including the data source with a comment on data quality of the milk production estimates used in the diary emission model, either in future NIRs or in the detailed methodology with a direct section reference to the information included in the text of future NIRs.

Manure management – CH_4 and N_2O

58. The ERT noted that in CRF table 4.B(b) the values for deer populations and dairy populations multiplied by N excretion do not add up to the total N reported. The ERT concluded that this is an underestimation of emissions. In response to a question raised by the ERT during the review, New Zealand acknowledged these underestimations and subsequently submitted revised emission estimates to the ERT on 7 September 2013. This correction increased agricultural emissions for all years by less than 1 per cent (24.6 Gg CO_2 eq in 2011) associated with a small increase in the N excretion rate for these animal categories. The ERT agrees with these revised estimates and recommends that New Zealand carry out a thorough QC check of its model code to minimize calculation errors.

59. In the documentation available through the NIR (including the detailed methodology), the ERT was unable to find the information or the sources for the ratios used to distribute N between urine and dung used in the development of the EF for pasture, range and paddock (EF3). In response to a question raised by the ERT during the review, the Party supplied this information to the ERT (values ranged between 66.1 per cent of N in urine for sheep, non-dairy cattle and deer and 73.6 per cent for dairy cattle). As it is a value used in deriving the pasture, range and paddock EF, the ERT recommends that the Party include this information in the text of the NIR or in an annex, or in the detailed methods document (with a direct section reference to the information included in the text of the NIR).

60. New Zealand uses the Australian Feeding Standards algorithms for cattle and sheep to estimate manure management emissions of CH_4. In the text of the NIR, it compares the EF with IPCC defaults but does not include comparisons with the tier 2 methodology in the NIR. During the review, the Party was asked to provide supplemental information on the methodology and how it compares with IPCC tier 2 methodology. In response to the questions raised by the ERT during the review, the Party explained that these algorithms better reflect the New Zealand agricultural situation and included a paper by Saggar et al. (2003)[3] which provided some comparison of IPCC methodologies with New Zealand methodologies. For transparency and comparability in documentation it is important to be able to easily compare methodologies among Parties. The ERT commends New Zealand for the quality of the work in the report that it supplied. The ERT recommends that the Party include access to information on the Australian Feeding Standards algorithms for cattle and sheep to estimate manure management emissions of CH_4 and provide explanations of the differences between the estimates produced by the New Zealand methodology and the IPCC tier 2 methodology. This information could be included: in the text of future NIRs; in the detailed methodology with a direct section reference to the information included in the text of future NIRs; or at minimum, with a link to the original article.

Direct soil emissions - N_2O

61. New Zealand uses country-specific EFs that are based on in-country research to estimate direct emissions from soils. Measured EFs are highly dependent on the interaction of weather conditions and soil conditions during the course of the studies. New Zealand provides little information in its NIR about how nationally representative EFs are derived. In response to questions raised by the ERT during the review, the Party provided supplemental information on the number of studies/measurements used in the development of country-specific EFs. Due to the inherent high variability in experimental results of N_2O research based measurements, the way in which the experimental results are treated to produce the final national EF is extremely important information and cannot be ignored or omitted from the documentation of the development of the final national EF. New Zealand has not simply taken the mathematical average of all research studies. The ERT commends the Party for the depth and quality of its in-country research on this subject, but recommends that the Party include greater detail on the derivation of the national EF in its NIR. This information should include the number of studies, the number of regions involved, the range of climatic conditions and the types of soils and drainage conditions, and describe the statistical methods that were used to treat this information to produce a representative value. This information could be included either: in the text of future NIRs; in the detailed methodology with a direct section reference to the information included in

[3] Saggar S, Clark H, Hedley C, Tate K, Carran A, Cosgrove G. 2003. *Methane Emissions from Animal Dung and Waste Management Systems, and its Contribution to National Budget.* Landcare Research Contract Report: LC0301/02.

the text of future NIRs; or at minimum with a link to the Kelliher et al., (2003)[4] publication in future NIR or detailed methodology.

62. In section 6.5.3 of the NIR, the Party has presented the uncertainties of N_2O emissions from agricultural soils. In this section, there is some discussion of the influence of factors such as soil type (drainage) and the vagaries of weather contributing to uncertainty. However, the ERT noted that it is not clear how these factors are integrated into the agricultural soils model, and therefore it is not clear how they would affect N_2O uncertainty. In response to questions raised by the ERT during the review, the Party provided supplemental information that confirmed that the text was in fact unclear. In the above-mentioned section, there is a contradiction in the information that is provided in the NIR uncertainty section and the description of the national country-specific EFs. This contradiction brings about confusion in attempting to understand both how the EF was derived and how the uncertainty analysis was carried out. The ERT recommends that the Party provide a clear explanation of the methodology used to carry out the uncertainty analysis. This explanation should include a description of the parameters that were allowed to vary during the Monte Carlo analysis, as well as the probability distributions that were used in the analysis and the source of those distributions. The information could be included in the NIR or in the detailed methodology with a section reference to the information in the NIR.

E. Land use, land-use change and forestry

1. Sector overview

63. In 2011, net removals from the LULUCF sector amounted to 13,540.19 Gg CO_2 eq. Since 1990, net removals have decreased by 51.8 per cent. The key driver for the decrease in removals is a reduction in the removals associated with the change in carbon stocks of living biomass on forest land remaining forest land. Within the sector, 27,221.30 Gg CO_2 eq of removals were from land converted to forest land. The other land-use categories are reported as net sources. Forest land remaining forest land accounted for 9,480.11 Gg CO_2 eq, grassland remaining grassland accounted for 2,103.34 Gg CO_2 eq and land converted to grassland accounted for 1,650.00 Gg CO_2 eq. The remaining 447.67 Gg CO_2 eq were from all other categories within the sector. Wetlands remaining wetlands and settlements remaining settlements were reported as "IE", "NA" and "NE", respectively

64. The LULUCF inventory is largely complete; all gases and land use and land-use changes categories are reported. Carbon stock changes in living biomass were reported as "NE" for a number of activities on the basis that there are no available methods in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) to estimate these emissions (e.g. wetlands remaining wetlands, settlements remaining settlements, and land converted to other land). New Zealand has also applied a basic assumption (i.e. no change as tier 1 or 2 method) for dead organic matter carbon pools for all activities except forest land remaining forest land and land converted to forest land. The ERT encourages New Zealand to explore the possibility of estimating carbon stock changes in the dead organic matter

[4] Kelliher F, Cox N, Henderson H, van der Weerden T, Gongol C, Luo J, Rollo M, de Klein C, Cameron K, and Giltrap D. 2011. *Analysis of N_2O emission factor data from field trials and N2O emissions inventory uncertainty assessment.* Contract Report: MAF POL 12206. Report prepared for the Ministry of Environment By Landcare Research and AgResearch. Wellington: Ministry of Environment.

carbon pool for woody biomass in grassland remaining grassland using an estimate from Wakelin (2004),[5] and report thereon in its next annual submission.

65. The ERT noted that the notation key "NO" was used for the total area (kha) and/or area of organic soil (kha) for most subcategories. In the NIR, New Zealand explained that the reporting of "NO" is on the basis that these land uses do not occur at detectable levels with current mapping accuracy. In response to a question raised by the ERT during the review, New Zealand explained that the area of land-use change under mineral and organic soils combined is less than 100 ha, hence AD are reported as "NO". New Zealand also indicated that it would clarify the comment contained in the CRF table that "no organic soils occur within the area subject to this land-use change" to enhance understanding of the issue. The ERT recommends that New Zealand provide explanation and comment on its use of the notation key "NO" in its next submission.

66. New Zealand used a tier 1 approach to calculate net carbon stock change in soils for all categories. In response to a question raised by the ERT during the review, the ERT concluded that there is a minor transparency issue in the description of the reference carbon stock (SOC_{REF}) in the NIR, and therefore recommends that New Zealand provide more detailed information for the SOC_{REF} estimation.

2. Key categories

Forest land remaining forest land – CO_2

67. The ERT found that New Zealand continues to report carbon stock changes in natural forest as "NA". This is based on the assumption that carbon stocks in natural forests are in a steady state. In response to a question raised by the ERT during the review, the Party responded that additional data had been collected and analysed during the year. The interim results were pending approval through the Reporting Governance Group at the time of the review, and the results of this work on carbon stock change in natural forest will be included in its next annual submission. The ERT commends the Party for its efforts to continuously improve its reporting in the LULUCF sector. The ERT strongly recommends that the Party include emission estimates for each carbon pool for each year of the inventory, and provide detailed documentation in the NIR on the research undertaken and interpretation of the results, and the effect of these estimates on the time series.

Grassland remaining grassland – CO_2

68. The ERT noted that the notation key "NE" is reported for the carbon pool dead organic matter. In response to a question raised by the ERT during the review, the Party explained that the notation key should be "NA" and explained that according to the IPCC good practice guidance for LULUCF, "the IPCC tier 1 approach assumes that there is no change in dead organic matter carbon stocks in grassland remaining grassland". The ERT recommends that New Zealand correct the notation key.

3. Non-key categories

Other (LULUCF) – CO_2

69. Controlled burning of grassland with woody biomass for the establishment or re-establishment of pasture has not been included in the inventory. In response to a question

[5] Wakelin SJ. 2004. Review of Shrubland Clearance Assumptions in the National Carbon Inventory. Contract report prepared for Ministry for the Environment by New Zealand Forest Research Institute Limited (trading as Scion). Wellington: Ministry for the Environment.

raised by the ERT during the review, New Zealand explained that the controlled burning of grassland with woody biomass is reported within the agriculture sector under controlled burning of savannas. The ERT recommends that New Zealand improve the transparency of its reporting by including cross-references in the NIR where appropriate.

F. Waste

1. Sector overview

70. In 2011, emissions from the waste sector amounted to 1,985.40 Gg CO_2 eq, or 2.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 3.6 per cent. The key drivers for the fall in emissions are initiatives directed at improving solid waste management practices in New Zealand – the Resource Management Act (1991) and the New Zealand Waste Strategy, which was adopted in 2002 (and revised in 2010). Within the sector, 67.0 per cent of the emissions were from solid waste disposal on land, followed by 32.8 per cent from wastewater handling. The remaining 0.1 per cent were from waste incineration.

2. Key categories

Solid waste disposal on land – CH_4

71. The ERT noted that the amount and composition of municipal solid waste disposed of at landfill is based on survey data from 1995 and 2004. The ERT reiterates a recommendation made in the previous review report that New Zealand explore how to improve the quality and temporal coverage of municipal solid waste data and report thereon.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

72. The ERT noted that New Zealand has reported no incineration of municipal waste in the country, and that only small amounts of clinical, quarantine and hazardous waste and sewage sludge are being incinerated. The Party uses the tier 1 method from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* to estimate emissions from these activities, and explained that the use of this method better suits national circumstances as it provides the most appropriate and modern methodologies for estimating emissions from waste incineration.

73. In line with national regulations, only certain types of waste are allowed to be incinerated. Further, only those incinerators that control combustion to maintain adequate temperature and provide sufficient residence time for complete combustion are allowed. The ERT found that, due to the above, New Zealand excludes from its inventory, emissions from incineration devices that do not meet these requirements – they are considered as open burning. The ERT also found that AD for waste incineration are very scarce, and default values for carbon content and degradable organic matter and EFs for the incinerated clinical and hazardous waste have been used. The ERT encourages New Zealand to improve its reporting of data, EFs and incineration practices in the country, including information on practices that are considered as open burning.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

74. Table 6 provides an overview of the information reported and parameters selected by the Party under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

	Findings and recommendations
Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Sufficient
Identify any elected activities under Article 3, paragraph 4	Activities elected: None
Identify the period of accounting	Commitment period accounting
Assessment of the Party's ability to identify areas of land and areas of land-use change	Sufficient

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2, CH_4 and N_2O

75. New Zealand has reported an area of 598,669 ha subject to afforestation and reforestation in 2011. The net emissions/removals due to these activities amounted to 18,440.09 Gg CO_2 eq (an increase of 0.5 per cent compared with 2010), with an emissions/removals IEF of –31.00 Mg CO_2 eq/ha. The estimated areas and net emissions/removals reported for afforestation and reforestation are in line with the estimations for LULUCF reported under the Convention.

Deforestation – CO_2, CH_4, N_2O

76. The ERT noted that "awaiting land", where there is no clear evidence to support harvesting or deforestation, has not been classified under deforestation and is not included in the period 2008–2011. New Zealand explained in the NIR that the collection of comprehensive data on harvested, deforested and awaiting areas for 2008 to 2012 is ongoing and that this information will be included in the next annual submission. However, this issue has the potential to result in an underestimation of emissions from deforestation due to the delayed classification for awaiting land which occurred during the first commitment period. The ERT strongly reiterates a recommendation made in the previous review report that the Party provide more transparent information on how it will avoid the potential underestimation of deforestation emissions at the end of the first commitment period.

77. The ERT noted that New Zealand did not provide in its annual submission estimates of non-CO_2 emissions from controlled burning and wildfires on land subject to deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol, owing to lack of data. A research study referred to in the NIR (Wakelin, 2012) investigated sources of AD

on controlled burning practices on forest land harvested post-1989; however, it was not able to provide the necessary data and information on the activity. Hence New Zealand continued to use the expert judgement that indicates that controlled burning of post-harvest residues on post-1989 forest land does not occur. The ERT, however, noted with concern that the emissions from wildfires on land under deforestation are not considered. The ERT commends the effort made by New Zealand to effect an improvement, but strongly reiterates the recommendation made in the previous review report that the Party include estimates of non-CO_2 emissions from controlled burning and wildfires on land subject to deforestation activities.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

78. New Zealand has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and the recommendation included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[6] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterates the main findings and the recommendation contained in the SIAR that the Party include in its publicly available information the years of issuance of ERUs.

79. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Calculation of the commitment period reserve

80. New Zealand has reported its commitment period reserve in its 2013 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (278,608,260 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

81. New Zealand reported that there are changes in its national system since the previous annual submission. They relate to specific measures identified and implemented by New Zealand in regard to strengthening QA/QC procedures designed to improve the quality of the GHG inventory and the annual submission, and to enhancing the terms of reference for the Reporting Governance Group to provide clarity on its operation and roles and responsibilities.

82. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

[6] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

4. Changes to the national registry

83. New Zealand reported that there are changes to its national registry since the previous annual submission. The Party described the changes in its NIR including: changes in contact details for the "main contact" and to the "release manager", and changes in publicly available information (cell phone, telephone and fax numbers were removed for security reasons from the New Zealand national registry website). The ERT concluded that, taking into account the confirmed changes in the national registry, New Zealand's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

84. New Zealand reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The Party described the changes, namely: further information on market imperfections, fiscal incentives, tax and duty exemptions and subsidies; information on a capacity-building workshop on fossil fuel subsidy reform; further information on a solar energy electricity project on Tokelau; and information on New Zealand's involvement in activities to provide assistance to Parties not included in Annex I to the Convention that are dependent on the export and consumption of fossil fuels in diversifying their economies. The Party described the changes in detail in its NIR. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

85. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of New Zealand, in accordance with the Article 8 review guidelines.

Table 7
Expert review team's conclusions on the 2013 annual submission of New Zealand

		Paragraph cross-refererces
The ERT concludes that the inventory submission of New Zealand is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
	Annex A sources[a]	Complete
	LULUCF[a]	Complete
	KP-LULUCF	Complete
The ERT concludes that the inventory submission of New Zealand has been prepared and reported in accordance with the UNFCCC reporting guidelines		Yes
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision		Yes

		Paragraph cross-references
15/CMP.1		
The Party's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Manage. ent in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Yes	
New Zealand has reported information on Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	
The Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

86. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph reference*
Cross-cutting	QA/QC	Provide information on the progress made in strengthening its QA/QC system	14
	Archiving	Include in its NIR the information provided to the ERT during the review week on the archiving system and how it is organized, and specify what is archived at MfE and at other agencies	17

Sector	*Category*	*Recommendation*	*Paragraph reference*
Energy	Sector overview	Include information on issues identified during New Zealand's 2013 internal review of the energy sector	22
		Include more background information on each recalculation with a view to enhancing the transparency of the GHG inventory	23
		Include in its NIR information on progress made towards reporting emissions from military activity under other (energy)	24
	Comparison of reference and sectoral approach	Apply greater rigour in its investigation of underlying reasons for the differences over the time series, especially for the later years when it is greater than 2.0 per cent	26
		Separate the reporting of fuels in the reference approach, with a view to improving the transparency of the comparison assessment, and report thereon	27
		Disaggregate the reporting of naptha (combined with crude oil) and lubricants and petroleum coke (combined under bitumen)	27
	International bunker fuels	Addresses the inconsistency between CRF table 1.A(b) and table 1.C	29
	Feedstocks and non-energy use of fuels	Clarify where emissions from methanol production are reported	31
	Stationary combustion: solid fuel – CO_2	Investigate the appropriateness of the 2007 EF for use in the earlier years of the inventory time series, and report thereon	32
	Coal mining and handling – CH_4	New Zealand include information on the revised estimates in its next annual submission	33
	Oil and natural gas – CO_2, CH_4	Report estimates of emissions from venting and flaring separately	34
		Report estimates of emissions from oil exploration and production and natural gas exploration and production/processing	34
		Include background information on the methodologies used to calculate emissions from natural gas distribution, transmission and storage	35
		New Zealand include information on the revised estimates in its next annual submission	36
	Navigation: liquid fuels –	Clarify the text in the NIR regarding the collection of data for marine diesel use in domestic navigation	37

Sector	*Category*	*Recommendation*	*Paragraph reference*
	CO_2, CH_4, N_2O		
	Oil and natural gas – N_2O	New Zealand include information on the revised estimates in its next annual submission	38
Industrial processes and solvent and other product use	General	Continue efforts to improve the transparency of its reporting by providing more detailed information in the NIR, while maintaining the confidentiality of the sensitive data	40
	Soda ash use – CO_2	Report AD for the use of soda ash and assess whether it is necessary to report the AD for limestone use as confidential, noting its multiple uses and ability to calculate the AD from the known CO_2 EF	41
		Include detailed information and methodological descriptions on how plant-specific data are estimated. Such information can include frequency of measurements, source streams considered and uncertainty tolerance for measurements of different parameters	42
	Consumption of halocarbons and SF_6 – HFCs and PFCs	Consider the guidance on reporting of background information provided in the IPCC good practice guidance for all subcategories and report accordingly in the NIR	43
		Try to obtain the information necessary to calculate actual emissions	44
		Improve QC activities to identify completeness problems in its inventory submission	45
	Lime production – CO_2	Report on the results of the work to disaggregate the types of lime produced by the three lime production companies (i.e. hydrated vs. non-hydrated) and revise the whole time series for lime production, if appropriate	46
		Reassess the uncertainty value assigned to lime production	47
	Limestone and dolomite use – CO_2	Include information on the revised emission estimates and continue to work with industries reporting under the NZ ETS with a view to identifying and resolving methodological differences	48
		Investigate the possibilities of other uses of carbonate in the inventory and consider developing balances of limestone and dolomite (import plus production minus export) to verify that no major uses are not accounted for	49
Agriculture	Enteric fermentation – CH_4	Provide in the NIR a clear explanation of the reasons for using an EF for emissions from swine that is lower than the IPCC default	55
		Report a summary of the findings from the current project on pasture quality either in future versions of its detailed methodology or in future NIRs and also progress its new research, and report back on progress either in future NIRs or in the detailed methodology with a direct section	57

Sector	*Category*	*Recommendation*	*Paragraph reference*
		reference to the information included in the text of future NIRs	
		Provide a brief summary of how monthly milk production is calculated, including the data source with a comment on data quality of the milk production estimates used in the diary emission model	
	Manure management – N_2O	Carry out a thorough QC check of the model code to minimize calculation errors in future submissions	58
		Include information on the sources for the ratios used to distribute nitrogen between urine and dung used in the development of the EF for pasture, range, paddock, in the text of the NIR or in an annex, or in the detailed methods document with a direct section reference to the information included in the text of the NIR	59
		Include access to information on the Australian Feeding Standards algorithms for cattle and sheep to estimate manure management emissions of CH_4 and explanations of the differences between the estimates produced by the New Zealand methodology and the IPCC tier 2 methodology	60
	Direct soil emissions – N_2O	Include greater detail in the NIR on the derivation of the national EF	61
		Provide a clear explanation of the methodology used to carry out the uncertainty analysis	62
LULUCF	General	Add an explanation and comment on the use of the notation key "NO"	65
		Provide more detailed information for the SOC_{REF} estimation	66
	Forest land remaining forest land – CO_2	Include emission estimates for each carbon pool for each year of the inventory, as well as detailed documentation in the NIR on the research undertaken and interpretation of the results, and the effect of these estimates on the time series	67
	Grassland remaining grassland – CO_2	Correct the notation key to "NA"	68
	Other (LULUCF) – CO_2	Improve the transparency of its reporting on controlled burning of grassland and woody biomass within the agriculture sector by including cross-references in the NIR where appropriate	69
Waste	Solid waste disposal on land – CH_4	Explore how to improve the quality and temporal coverage of municipal solid waste data and report thereon	71
KP-LULUCF	Deforestation –	Provide more transparent information on how the Party will avoid the potential underestimation of emissions from	76

Sector	*Category*	*Recommendation*	*Paragraph reference*
	CO_2, CH_4, N_2O	deforestation at the end of the first commitment period	
		Include estimates of non-CO_2 emissions from controlled burning and wildfires on land subject to deforestation activities	77
Information on Kyoto units		Include in the publicly available information the years of issuance of ERUs	78

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, ERU = emission reduction unit, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MfE = Ministry for the Environment, NA = not applicable, NIR = national inventory report, NO = not occurring, NZ ETS = New Zealand emissions trading scheme, QA/QC = quality assurance/quality control.

IV. Questions of implementation

87. No questions of implementation were identified by the ERT during the review.

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy					AD, EF, error correction
A. Fuel combustion (sectoral approach)					
1. Energy industries	4.03	93.15	0.1	1.4	
2. Manufacturing industries and construction	28.92	197.57	0.6	3.9	
3. Transport	–138.40	–82.90	–1.6	–0.6	
4. Other sectors	135.38	10.55	4.9	0.4	
5. Other					
B. Fugitive emissions from fuels					
1. Solid fuels	8.74	19.60	3.2	3.5	
2. Oil and natural gas	72.75	19.43	7.3	1.0	
2. Industrial processes					AD, EF, error correction, methodological change
A. Mineral products	4.06	–37.82	0.7	–4.9	
B. Chemical industry		0.00		0.0	
C. Metal production		53.39		2.4	
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6		–9.18		–0.01	
G. Other					
3. Solvent and other product use					
4. Agriculture					AD, EF, error correction, methodological change
A. Enteric fermentation	–166.57	14.21	–0.7	0.1	
B. Manure management	–5.00	–7.31	–1.0	–1.1	
C. Rice cultivation					
D. Agricultural soils	0.29	–9.80	0.0	–0.1	
E. Prescribed burning of savannas					

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
F. Field burning of agricultural residues	–0.36	1.77	–1.5	7.1	
G. Other					
5. Land use, land-use change and forestry					AD, methodological change
A. Forest land	–567.39	2 175.93	2.1	–9.2	
B. Cropland	1.23	–0.31	0.2	–0.1	
C. Grassland	–157.77	–29.63	14.7	–0.9	
D. Wetlands	1.60	20.86	1.0	NA	
E. Settlements	–0.11	–0.16	–0.1	–0.4	
F. Other land	–1.94	–0.60	–30.0	–5.5	
G. Other					
6. Waste					AD, error correction
A. Solid waste disposal on land		20.52		1.5	
B. Wastewater handling	5.89	0.46	1.1	0.1	
C. Waste incineration					
D. Other					
7. Other					
Total CO_2 equivalent without LULUCF	–774.65	283.64	–0.1	0.4	
Total CO_2 equivalent with LULUCF	–50.27	2 449.73	–2.4	4.7	

Abbreviations: AD = change in activity data, EF = change in emission factor, LULUCF = land use, land-use change and forestry.

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	278 608 260			278 608 260
Annex A emissions for 2011				
CO_2	33 162 221	33 175 525		33 175 525
CH_4	27 050 149	27 119 260		27 119 260
N_2O	10 689 683	10 695 736		10 695 736
HFCs	1 885 072	1 885 161		1 885 161
PFCs	30 181			30 181
SF_6	17 620			17 620
Total Annex A sources	**72 834 925**	**72 923 483**		**72 923 483**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	−18 551 525			−18 551 525
3.3 Afforestation and reforestation on harvested land for 2011	111 431			111 431
3.3 Deforestation for 2011	1 674 615			1 674 615
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	33 403 152	33 421 913		33 421 913
CH_4	26 875 704	26 943 812		26 943 812
N_2O	10 429 949	10 436 108		10 436 108
HFCs	1 077 694			1 077 694
PFCs	40 809			40 809
SF_6	20 462			20 462
Total Annex A sources	**71 847 770**	**71 940 798**		**71 940 798**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	−18 455 906			−18 455 906
3.3 Afforestation and reforestation on harvested land for 2010	106 077			106 077
3.3 Deforestation for 2010	1 029 403			1 029 403
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	33 521 183	33 515 308		33 515 308
CH_4	26 853 623	26 918 182		26 918 182
N_2O	10 127 804	10 134 533		10 134 533
HFCs	872 408			872 408
PFCs	46 140			46 140
SF_6	19 786			19 786
Total Annex A sources	**71 440 943**	**71 506 357**		**71 506 357**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–18 293 562			–18 293 562
3.3 Afforestation and reforestation on harvested land for 2009	96 244			96 244
3.3 Deforestation for 2009	1 368 062			1 368 062
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	36 451 316	36 452 548		36 452 548
CH_4	26 438 519	26 497 762		26 497 762
N_2O	10 315 143	10 322 537		10 322 537
HFCs	807 259			807 259
PFCs	38 844			38 844
SF_6	15 126			15 126
Total Annex A sources	**74 066 207**	**74 134 077**		**74 134 077**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	−18 199 478			−18 199 478
3.3 Afforestation and reforestation on harvested land for 2008	82 418			82 418
3.3 Deforestation for 2008	1 586 189			1 586 189
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for New Zealand 2013. Available at <http://unfccc.int/resource/docs/2013/asr/nzl.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2013. Available at <http://unfccc.int/resource/webdocs/sai/2013.pdf>.

FCCC/ARR/2012/NZL. Report of the individual review of the annual submission of New Zealand submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/nzl.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Dr. Olia Glade (Ministry for the Environment), including additional material on the methodology and assumptions used. The following documents[1] were also provided by New Zealand:

Saggar S, Clark H, Hedley C, Tate K, Carran A. Cosgrove G. 2003. *Methane Emissions from Animal Dung and Waste Management Systems, and its Contribution to National Budget.* Landcare Research Contract Report: LC0301/02. Wellington: Ministry of Agriculture and Forestry.

Wakelin SJ. 2004. *Review of Shrubland Clearance Assumptions in the National Carbon Inventory*. Contract report prepared for Ministry for the Environment by New Zealand Forest Research Institute Limited (trading as Scion). Wellington: Ministry for the Environment.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
C	confidential
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol CRF common reporting format
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GST	goods and services tax
ha	hectare
HFCs	hydrofluorocarbons
HFC-227ea	heptafluoropropane
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kha	kilo-hectare
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
Mg	megagram (1 Mg = 1 tonne)
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SOC_{REF}	reference carbon stock
UNFCCC	United Nations Framework Convention on Climate Change
Y_M	methane yield rate